by any person possessed of ordinary skill and knowledge, and I earnestly join in its advocacy by the greatest of our modern surgeons."—*Lancet*, Oct. 5, 1861.

57. *Operative Treatment of Peritonitis.* By Dr. MARTEN, of Hörde.—In full consciousness of the insufficiency of my powers, and resting on two cases briefly noted in the course of a laborious practice, I can only aim at inviting the reader to repeat the following investigation of a morbid process, which, so far as I am aware, has not of late years been thoroughly worked out in German dissertations and monographs—at the same time calling attention to some voids, particularly the analogy of peritonitis with inflammation of other serous membranes, and especially of the pleura, promoting the plan of operative treatment, and submitting *gastrotomy in abdominal empyema* to the examination of competent judges. Far from believing that I am bringing forward anything new, as all manuals of special pathology and therapeutics mention surgical interference in circumscribed peritoneal abscesses—and Lebert[1] even warns us not thereby unseasonably to disturb the accumulation of effusion tending towards the bowel, the bladder, or the vagina—I will rather support the application of some old rules of general oncology to inflammation of the peritoneum, and adopt Leubuscher's words:[2] "When by considerable increase of the effusion very great difficulty of breathing arises, and paralysis of the diaphragm is to be feared, paracentesis may become necessary as a vital indication, though in continued inflammatory irritation it affords much fewer chances than in simple dropsy."[3]

My two cases are: 1. Lina Lessing, aged 10 years, a slender child, born of healthy parents, and having hitherto always enjoyed good health, took ill suddenly on the 12th of May, 1858, in consequence of cold, with symptoms of general peritonitis; violent persistent pain over the whole abdomen, which latter could not bear the slightest touch, was hot and tense; vomiting, constipation, interrupted and rapid respiration, constant fever, with the pulse at 120. Copious local abstractions of blood, in combination with the use of opium, produced only transient relief, until on the 18th, with slight remission of the fever and pain, an effusion took place into the sac of the peritoneum, demonstrable throughout three fingers' breadth above the pubis by distinct fluctuation and a dull sound on percussion, and altering its level on change of position. Under the exhibition of half a grain of calomel every two hours, the effusion had on the 31st with remission of pain ascended above the navel, the latter projecting in the form of a thimble, and the abdomen being so distended that it presented the appearance of a six months' pregnancy in miniature. On the 3d of June, a small, round, yellowish-gray transparent spot had formed on the point of the navel, into which I passed a Langenbeck's insect-needle to behind the lancet-shaped extremity, and in drawing it out somewhat enlarged the puncture. About a pint of creamy yellow, not fetid pus, was immediately discharged in a full stream, mixed with a few little flakes and thicker coagulated lumps. Under the use of warm cataplasms and Stromeyer's oiled tents, the discharge continued in constantly diminishing quantity until the 8th, when the navel had resumed its normal shape, a little serous fluid trickling from the opening from time to time. The patient having been put upon strengthening diet, the opening had on the 15th closed; the sound on percussion over the whole abdomen was again tympanitic, digestion was normally performed, the bowels were regular, and the child to be considered as well.

2. Augustus Bennekamp, aged 5 years, the child of healthy parents, enjoyed good health until the 9th of January in the present year. He then took ill, without any assignable external cause, of acute peritonitis, which, after seven days' antiphlogistic treatment, assumed a chronic form; the vomiting ceased, the appetite and the action of the bowels gradually returned, the fever continued in a remittent form. The abdomen remained distended, and was very painful to

[1] Handbuch der Practischen Medicin, Band ii. p. 410.

[2] Med. Klinik, Band i. p. 608.

[3] Compare also Henoch, Klinik der Unterleibskrankheiten, Band iii. p. 328; and Siebert, Diagnostik der Krankheiten des Unterleibes, p. 176.

the touch; and on motion, there was fluctuation, and a dull sound on percussion in the lower part of the abdomen, while the discharge of urine continued undiminished. The free effusion, the level of which varied with the position of the patient, in this case ascended to the navel, though the latter was not at the end of the fourth month prominent; the linea alba, on the contrary, projected in a boat shape. Notwithstanding that his appetite continued good, the patient was worn to a skeleton. Rigors were observed neither in this nor in the preceding case. Both outward and internal remedies having failed, and the parents having refused to allow surgical interference, our efforts were now confined to regulating the functions and supporting the strength. At last, on the 5th of June, spontaneous rupture took place; through a small opening in the navel some ounces of ordinary pus were first discharged, then a serous fluid mingled with yellowish-gray, non-fecal, crumbling flakes, alternating with pus. Under bad management the opening from time to time became obstructed; the pus became inspissated; and the following state exists to-day: The chylopoietic functions are nearly normally performed; the strength is so far restored, while the fulness increases, that the little patient can walk some steps. The lower half of the abdomen, particularly in the linea alba, is still distended, painful, and hard. The sound on percussion is there dull; fluctuation is no longer perceptible; the lower half of the navel is closed; a serous fluid occasionally trickles forth. The possibility of complete recovery is not to be denied; nevertheless the chronic stage includes the further dangers of fresh inflammation, perforation, adhesions, pyemia, and hectic. In my opinion the seasonable opening of the abscess would have justified us in expecting a more rapid, more certain, and more perfect cure.

The question whether, in this case, we had to deal with a general or circumscribed peritonitis, I pass over, because, as Leubuscher[1] correctly remarks, "where the disease is of general extent, we can suppose only that a proportionally greater part of the peritoneum is attacked." Incomparably more important does it appear in practice to diagnose the quality of the effusion, the empyema abdominis, as the result of an extensive so-called general peritonitis, and for this we have sufficient data.[2] As original forms of the exudation, Bamberger describes[3] the fibro-serous and the hemorrhagic. When, in the first form, the quantity of the fluid portion is so considerable as to give a distinct feeling of fluctuation, it is, in the first place, to be borne in mind that Wintrich,[4] in pleuritic effusions, has, even after only five hours, "always" demonstrated a great number of pus-cells; and, secondly, that tolerably reliable symptoms may be discovered, indicative of the resorption of the serous portion, or of puriform metamorphosis.

2. The hemorrhagic exudation arising from dissolution of the blood or erosion of a bloodvessel, is, when it occurs in considerable quantity, to be distinguished by the preceding and accompanying illness, and the anemia; and in case of purulent metamorphosis, the diagnosis will present no great difficulties. For the change into tuberculous and cancerous exudation, the well-known diagnostic elements obtain; and an ichorous effusion is to be suspected, when puerperal, pyemic, septic processes, or perforations, more or less rapidly induce a fatal result.

The purulent nature of the effusion must, on the contrary, I believe, be inferred in practice, when, after the first acute stage of peritonitis has passed,

1. The distinctness of the fluctuation; and,
2. The quantity of the exudation, remain stationary or increase; consequently,
3. The boundary of the dull sound on percussion ascends in the upright position; and,
4. Exhibits a change of level according to the position of the patient.

Rigors and remission of the spontaneous pain, while sensibility to touch and motion continue, insure the diagnosis and justify the name of empyema abdomi-

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[1] Loc. cit., p. 599.

[2] The possibility of confounding this disease with ascites, an ovarian cyst, and abscess of the abdominal wall, or with the distended bladder, seems scarcely to be apprehended.

[3] Virchow, vi.

[4] Virchow, Bd. i. p. 231.

nis. If in addition there be a circumscribed projection of the abdomen, the empyema necessitatis, and the time and place for opening the abdomen are at the same time determined.

If we follow the fate of the pus in the sac of the peritoneum, four possibilities occur to us:—

1. Resorption. The critical evacuations of large deposits of pus through the rectum and bladder, assumed by the older pathologists as occurring without perforation, do not appear to be confirmed by exact observation. (Abundant sediment of urates in the cooled urine redissolved on heating the fluid.) But should we not deny the possibility of such a result in the case of moderate deposits of pus, which might have arisen through the confluence of circumscribed abscesses, we must, on the other hand, remember that it involves the great danger of pyemia and phlebitis.

2. Enucleation, thickening, and cretaceous metamorphosis. In this result, too, the maintenance of life and perfect recovery are by no means certain, as occasion may thereby be given to the development of inflammatory exacerbations, to purulent absorption, as well as to different diseases of the intestinal tube and of the other abdominal viscera.

3. Perforation of various hollow organs, in which perfect recovery most rarely occurs—death, on the contrary, being by far the most common result, as the contents of the abscess may be discharged into the cavity; and, on the other hand, in the absence of Roser's valvular apparatus, the contents of the latter or the atmospheric air may obtain access to the former, and induce ichorous decomposition.

4. Direct evacuation of the abscess externally, to lead in particular cases to the discussion of which problem of art is the object of these pages. Richter's remark[1] is undoubtedly to be quoted here: "Thus we have sometimes found an absolutely milky fluid in the cavity of the abdomen, and observed that the disease arose merely from a metastasis of milk. In such a case we have nothing to do but to evacuate this fluid. The disease never appears again, when once it is removed. Operation is the only means required for the total removal of the disease." Accurate examination would perhaps have led to the discovery of creamy pus in the milk. These results may be combined with one another.[2]

Statistical investigations as to the frequency of each of these results are the first desiderata; secondly, their pathological anatomy in reference to the formation and reformation of the membranes, as in my first case after recovery the movements of the intestine were in no way impeded, and the serous membranes therefore appeared to be wholly restored.[3] The resorption of the fibro-serous and of the hemorrhagic, as well as of the purulent exudation, would manifest itself by the opposite signs:—

1. By disappearance of the fluctuation; and,
2. By decrease of the quantity of the effusion: therefore,
3. The boundary of the dull sound on percussion sinks, or becomes partially circumscribed; and shows,
4. No change of level according to the patient's position.

Palpation of the more solid and tumour-like exudation, and the great improvement in the general health, will in this case confirm the diagnosis. The indications for operative interference in empyema abdominis may be stated analogously to those for thoracocentesis:—

1. The indicatio vitalis laid down by Leubuscher, and quoted above—insufficient respiration and threatening paralysis of the diaphragm, through considerable increase of the exudation—will, in my opinion, provisionally hold good only where the effusion is of puriform quality.
2. The empyema necessitatis requires immediate opening.
3. When, after the expiration of the first acute stage of inflammation and remission of the fever, and notwithstanding the adoption of suitable treatment,

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[1] Wundarzneikunde, Band v. p. 125.

[2] Compare Rokitansky, Path. Anat., Band vi. p. 172.

[3] Compare Volz, on Perforation of the Vermiform Appendix caused by Alvine Concretions, &c., p. 61.

resorption is too long about setting in, and the considerable effusion remains stationary or increases, the time we may wait can in general not be even approximately fixed, and depends upon the state in other respects of the patient, the degree of marasmus, of the secondary dropsy, &c.

The contra-indications which present themselves are:—

1. The acute stage of inflammation;

2. Considerable complications: thus, the puerperal process will exclude all manual interference.[1] Whether in many cases of perforation of the intestine where the situation of the lesion can be accurately defined, particularly after typhlitis and inflammation of the vermiform appendix, an incision (colotomia) would not afford a better prospect, and be more rational, than the *opium euthanatodes*, I shall not venture to decide.[2]

As to the prognosis, I have nothing to say beyond the general well-known principles.

With respect to the choice of the place for operation, in empyema necessitatis this is given; under other circumstances the linea alba, or the part which is most prominent and yields the most distinct feeling of fluctuation, is to be preferred.[3] In Dieffenbach's warning and apprehension,[4] I cannot participate: "We should avoid," he says, "puncturing the navel, when the skin is protruded or attenuated. In such instances the wound heals with difficulty or not at all, and may become dangerous to life." But, as in my first case, the choice of situation is sometimes excluded; and even old Gottl. Aug. Richter says,[5] in speaking of ascites: "As the little puncture does not immediately close, the continual trickling forth of the water (or pus) prevents the too rapid reaccumulation of the fluid in the abdominal cavity" (the entrance of air and other unfavourable accidents). "With respect to the operation, we may have the less hesitation, as the swollen navel, if not opened, usually gives way spontaneously; for cases have been observed where it has broken of itself, and the water has, without any evil consequence, been discharged; the operation, moreover, has already actually been successfully performed."[6] "The fear of umbilical hernia (Garangeot) appears to be unfounded (Sharp), especially when a small opening is made." Although the opening is usually situated by no means at the lowest point of the abscess, the complete discharge of the pus is effected, in opposition to the law of gravity, through the contractions of the diaphragm and of the abdominal muscles.[7]

Respecting the mode of operating, I am convinced that, as in thoracocentesis according to Marotte, so in empyema abdominis, the preference must be unconditionally given to incision with the knife; or, what is equivalent, to the valvular incision and perforation of the parietal peritoneum with the point of the knife (Rieke), instead of puncture with the trocar, and for the following reason:—

It is prudent, in deep abscesses, to divide the layers covering them gradually, and by renewed palpation to make the fluctuation (or pulsation) always more distinct, especially where the walls are fatty or œdematous.

The entrance of air, which when to a slight extent is confessedly not of much consequence, in the operation for empyema abdominis, occurs much less easily than in that for empyema thoracis; and, if we do not operate with the trocar, perhaps never takes place, because the yielding of the soft integuments to the external atmospheric pressure, and the immediate contractions of the diaphragm and abdominal muscles, must render it nearly impossible. In very well-marked cases, the practised and bold operator, like Velpeau, may, in opening the pleural

[1] Compare Moser, Geschlechtskrankheiten des Weibes, p. 587; Scanzoni, Geburtshülfe, p. 962.

[2] Compare Piorry's Proposal, Rev. Med.-Chir., October, 1847; Stromeyer's Cases in Maximen der Kriegsheilkunde, p. 636; and Laparotomy in Fecal Extravasations, Roser, Anat. Chir., p. 224.

[3] Bamberger, *loc. cit.*, p. 697.

[4] Vidal-Bardaleben, Chirurgie, Band iii. p. 681.

[5] Anfangsgründen der Wundarzneikunst, Band v. p. 134.

[6] Sims, Memoirs of the Medical Society, vol. iii.

[7] Compare Stromeyer, *loc. cit.*, p. 191.

cavity, without further preparation thrust the bistoury through the abdominal wall. Even for injection, the advisability of employing which cannot be considered as a settled point, I believe the use of the trocar to be not absolutely necessary, as it appears to me that by employing a filled syringe the entrance of air can be equally well avoided. Opening the abscess, on the contrary, by means of caustics, drawing plaster, setons, or blisters, appears, *à priori*, to be as impracticable as the establishment of a counter-opening.

For the after-treatment, the oil-tent and the application of warmth and moisture are sufficient; in the general management, a strengthening regimen should be adopted.—*Dublin Quarterly Journal*, August, 1861, from *Virchow's Archiv.*, Bd. xx. Heft 5 and 6.

58. *On Certain Grave Evils Attending Tenotomy, and on a New Method of Curing Deformities of the Feet.*—A paper with this title was read by Mr. Richard Barwell before the Royal Medical and Chirurgical Society, November 26, 1861. The author remarked that the purely mechanical treatment of club-foot, which had since 1832 been superseded by tenotomy, could as a rule deal very successfully with those lateral twists of the extremity which are called varus and valgus, but that the equinal deformity could hardly ever be cured by these means. This peculiarity is attributable to the great power of the muscles attached to the tendo-Achillis; for contracted muscles may be lengthened with an ease which is, *cæteris paribus*, in direct ratio with their power. At the present time the treatment of pes equinus is, above all others, simple and satisfactory, because division of the tendo-Achillis gives the means of lengthening this part in a few days. In a similar manner, though in different degrees, the treatment of all other deformities in which extension mingles is assisted by this section. The inward twist of the foot—varus—is now treated by division of four tendons at least (tibialis posticus and anticus, flexor longus digitorum and the tendo-Achillis), and frequently also of the plantar fascia. A very similar treatment is inflicted on valgus. "The peronei tendons are to be divided, or, together with them, those of the extensor longus digitorum and the tendo-Achillis, and also those of the tibialis anticus and extensor proprius pollicis, when they are retracted." Can we be surprised that after this there should be, as admitted by the above-quoted orthopædist, "difficulty in continuing sufficient support to the arch of the foot? and even after the arch has been perfectly restored, support is required during many months."[1] But if the deformity have arisen, not from spasm in the predominant muscles, but from debility of their antagonists, division of the still active tendons produces disastrous consequences. Mr. Barwell was led, four years ago when examining some old cases of tenotomized feet whose actions were clumsy and ill-performed, to doubt the desirability of dividing several other tendons as unhesitatingly as above described; and he thinks himself now in a position to explain the dangers and evils resulting from such practice. In 1842, M. Bouvier reported to the Académie Royale several experiments performed on the tendons about the feet of dogs, and one on a horse. In no one case did these tendons unite so as to be of any subsequent value. Moreover, there are examples on the human subject in a recent work on the "Reparative Process in Human Tendons." Mr. Adams has collected together all the cases he could get at of *post-mortem* examination after tenotomy. Amongst these there are seven in which other tendons besides the Achilles were divided, and in every one of them one or more of the severed tendons is either not united at all, or has become attached to the bone or surrounding parts, so as to be of no possible use hereafter.[2] The evident and sole conclusion from them is, that such muscles as the tibialis posticus and flexor longus digitorum might as well be struck by sudden and irremediable paralysis as be subjected to the knife of the tenotomist, and that the tibialis anticus is only a little better situated. Probably the peronei are quite as exposed to non or false union as the two first-named muscles, since their situation behind bones is analogous. Thus, to divide these tendons is to produce a lameness, perhaps less apparent, but more incurable,

[1] Brodhurst on Club-foot.

[2] An analysis of the cases justifying these assertions was appended.